

PURCHASE DESCRIPTION

SIGNAL GENERATOR 50 MHz to 6 GHz

FSNSF-B

- 1.0 GENERAL This procurement requires a stable microwave signal generator capable of generating signals over the frequency range of 50 MHz to 6 GHz with internal and external modulation capabilities.
- 2.0 CLASSIFICATION The equipment shall meet the requirements of MIL-T-28800D, Type III, Class 5, Style E, Color R for Navy shipboard, submarine, and shore applications with the following modifications and exceptions:
- a. The non-operating temperature requirement is limited to the range of -40°C to +70°C.
 - b. The relative humidity requirement is limited to 95% noncondensating.
 - c. The operating and non-operating altitude requirements are not invoked.
 - d. The EMI requirement is modified as follows:

CS01	RE01	RS03
CS02	RE02	
CS06		
 - e. The warm-up time is extended to one hour.
- 3.0 OPERATIONAL REQUIREMENTS The equipment shall be capable of generating signals within the parameters and accuracies specified herein.
- 3.1 Frequency Characteristics
- 3.1.1 Frequency Range: At least 50 MHz to 6 GHz
 - 3.1.2 Frequency Resolution: Minimum resolution at least 1 kHz; digital readout
 - 3.1.3 Frequency Accuracy: Equal to accuracy of reference standard (CW mode)
 - 3.1.4 Frequency Stability (equal to or better than limits specified below)
 - 3.1.4.1 Internal: Less than 1 part in 10^9 /hr at 25°C \pm 5°C after one hour warmup
 - 3.1.4.2 External: Equal to external standard frequency stability
 - 3.1.4.3 Temperature: Less than ± 2 parts in 10^5 change over 0 to 50°C temperature range
 - 3.1.5 Residual Modulation (CW mode in 50 Hz to 15 kHz detection BW)
 - 3.1.5.1 FM: Less than 150 Hz rms
 - 3.1.5.2 AM: Less than 0.15% pk

3.1.6 Spectral Purity {F = carrier frequency}

- 3.1.6.1 Harmonics: < -30 dBc
- 3.1.6.2 Power Line/Fan Rotation Related Harmonics: < -30 dBc (< 1 kHz from carrier)
- 3.1.6.3 Non-harmonics/Spurious: < -55 dBc (\geq 10 kHz from carrier)
- 3.1.6.4 Phase Noise: < -80 dBc/Hz at 10 kHz offset from carrier
- 3.1.6.5 RF Leakage: < -70 dBm into 50 Ω (using 2-turn, 1 inch diameter loop 1 inch from any surface, with output connector terminated in 50 Ω)

3.2 Output Characteristics

- 3.2.1 Range: +10 to -120 dBm (minimum)
- 3.2.2 RF Output: Levelled output shall be available at ± 10 dBm or less.
- 3.2.3 Accuracy: ± 2.0 dB for output levels from +10 dBm to -50 dBm; additional 0.1 dB/10 dB step for levels below -50 dBm
- 3.2.4 Display/Resolution: Digital display; minimum resolution of 0.1 dB
- 3.2.5 Flatness: ± 1.0 dB measured at an output level of +10 dBm
- 3.2.6 Impedance/Connector: 50 ohms; type-N female connector
 - 3.2.6.1 VSWR: The maximum VSWR of the output connector shall be no greater than 2:1.
- 3.2.7 Reverse Power Protection: The generator shall be capable of accepting the following signal levels at its output connector without resulting damage.
 - 3.2.7.1 Average Power: 5 watts
 - 3.2.7.2 Peak Power: 2 kw (2.3 to 6.0 GHz)

3.3 Modulation Characteristics

3.3.1 Pulse Modulation

- 3.3.1.1 Internal
 - 3.3.1.1.1 Rate (PRF): At least 50 Hz to 50 kHz
 - 3.3.1.1.2 Width (PW): 0.1 to 10.0 microseconds
 - 3.3.1.1.3 Rise/Fall Times: Less than 50 nanoseconds
 - 3.3.1.1.4 ON/OFF Ratio: Greater than 80 dB
 - 3.3.1.1.5 Delay: At least 50 nanoseconds to 100 milliseconds; accuracy 20% of setting
 - 3.3.1.1.5.1 Sync Pulse Output: TTL compatible; risetime less than 50 nanoseconds
 - 3.3.1.1.5.2 Video Pulse Output: TTL compatible; width corresponds to PW control setting
 - 3.3.1.1.6 External Trigger Input: TTL compatible; at least 100 Hz to 50 kHz; provides sync rate for pulse modulation

- 3.3.1.2 External
- 3.3.1.2.1 Rate (PRF): At least 50 Hz to 50 kHz
- 3.3.1.2.2 Width (PW): Greater than 0.1 microseconds
- 3.3.1.2.3 Video Output: TTL compatible pulse; same PW and PRF as external input pulse
- 3.3.1.2.4 Pulse Input: TTL compatible

3.3.2 Amplitude Modulation (AM) [Level \leq 0 dBm] {F = carrier freq; Δ F = peak freq deviation}

- 3.3.2.1 Internal AM
- 3.3.2.1.1 Rate: At least 400 Hz and 1 kHz
- 3.3.2.1.2 Depth: 0 to 90% minimum
- 3.3.2.1.3 Accuracy: $\pm 10\%$ of setting [50% depth @ 1 kHz]
- 3.3.2.1.4 Distortion: $\leq 5\%$ [50% depth @ 1 kHz]
- 3.3.2.1.5 Incidental FM: ≤ 200 Hz rms (0.05 - 15 kHz BW) [50% depth @ 1 kHz]
- 3.3.2.1.6 Residual AM (AM mode): $\leq 0.2\%$ pk (0.05 - 15 kHz BW) [0.0% depth @ 1 kHz]
- 3.3.2.2 External AM
- 3.3.2.2.1 Rates: At least 10 Hz to 20 kHz
- 3.3.2.2.2 Depth: 0 to 90% minimum
- 3.3.2.2.3 Distortion: Less than 5% at 50% depth and 1 kHz rate

3.3.3 Frequency Modulation (FM) {F = carrier freq; Δ F = peak freq deviation}

- 3.3.3.1 Internal FM
- 3.3.3.1.1 Rate: At least 400 Hz and 1 kHz
- 3.3.3.1.2 FM Deviation: ≤ 400 Hz to at least 100 kHz peak [F \leq 100 MHz]
 ≤ 400 Hz to at least 1 MHz peak [100 \leq F \leq 500 MHz]
 ≤ 400 Hz to at least 2 MHz peak [F \geq 500 MHz]
- 3.3.3.1.3 FM Accuracy: $\pm 10\%$ (Δ F ≥ 50 kHz); $\pm 20\%$ ($5 \leq \Delta$ F < 50 kHz)
- 3.3.3.1.4 Incidental AM: $\leq 0.2\%$ (50 Hz - 15 kHz BW) [Δ F = 20 kHz @ 1 kHz]
- 3.3.3.1.5 Residual FM (FM mode): ≤ 500 Hz rms (0.05 -15 kHz BW) [Δ F = 0.0 kHz @ 1 kHz]
- 3.3.3.2 External FM
- 3.3.3.2.1 Rates: At least 20 Hz to 100 kHz
- 3.3.3.2.2 FM Deviation: ≤ 400 Hz to at least 100 kHz peak [F \leq 100 MHz]
 ≤ 400 Hz to at least 1 MHz peak [100 \leq F \leq 500 MHz]
 ≤ 400 Hz to at least 2 MHz peak [F \geq 500 MHz]
- 3.3.3.2.3 FM Accuracy: $\pm 10\%$ (Δ F ≥ 50 Hz); $\pm 20\%$ ($5 \leq \Delta$ F < 50 kHz)
- 3.3.3.2.4 Distortion: Less than 5% for 400 kHz dev at 50 kHz rate

4.0 GENERAL REQUIREMENTS

- 4.1 Power Source: 115 and 230 Vac $\pm 10\%$, single phase, at line frequencies of 50, 60, and 400 Hz within $\pm 10\%$
- 4.2 Input Power: The maximum power required for operation shall not exceed 250 watts.
- 4.3 Calibration Interval: The calibration interval shall be 12 months minimum. The equipment shall be within all accuracy requirements specified herein, with a $> 72\%$ confidence factor following a calibration interval of 12 months.

- 4.4 Remote Operation: The unit will be capable of remote operation via IEEE-488 bus interface. It shall operate as a talker or listener such that all functions except the power on/off switch are controllable and shall have as a minimum the following subset of GPIB commands: AH1, SH1, T6, L4, SR1, RL1, DC1, DT1.
- 4.5 Dimensions: The total unit volume shall not exceed 2800 cubic in (46,000 cubic cm).
- 4.6 Weight: The overall weight of the unit shall not exceed 75 pounds (27.3 kg).